

UNITED STATES PATENT OFFICE.

THOMAS INGHAM, OF CHEETHAM, COUNTY OF LANCASTER, ENGLAND.

PROCESS OF DYEING.

SPECIFICATION forming part of Letters Patent No. 433,790, dated August 5, 1890.

Application filed October 28, 1889. Serial No. 328,467. (No specimens.) Patented in England February 20, 1889, No. 2,984.

To all whom it may concern:

Be it known that I, THOMAS INGHAM, a subject of the Queen of Great Britain and Ireland, residing at Cheetham, Manchester, in the county of Lancaster, England, have invented Improvements in Dyeing Woven or Knitted Fabrics of Mixed Vegetable and Animal Fibers, (for which I have applied for British patent, No. 2,984, dated February 20, 1889,) of which the following is a specification.

This invention relates to the mode of producing black and other colors upon woven or knitted fabrics of mixed vegetable and animal fibers, such, for instance, as cotton and wool. Hitherto such mixed, woven, or knitted fabrics could not be dyed at one process after weaving, except certain limited classes, by the use of aniline dyes; but it has been the practice in the case of fabrics composed of cotton and wool, for instance, either to dye the cotton warp by means of a mordant and a coloring-matter previously to weaving, and to weave the same with an undyed woolen weft, and afterward to redye the cloth with a coloring-matter which was fixed by oxidation upon the woolen fiber; or in some cases the cloth was woven or knitted with both the cotton warp and woolen weft in the gray or undyed state, then subjected to a mordant and a coloring-matter to dye and fix the vegetable fibers, and afterward with a coloring-matter and an oxidizing agent to dye and fix the animal fibers, so that in either case there has always hitherto been a double process of dyeing (once with a mordant and once with an oxidizing agent) to dye the mixed fabric. According to my invention I am enabled to weave both the cotton and woolen yarns in the gray or undyed state, and then to dye and fix the color upon the mixed cloth (after weaving) at one and the same operation.

My improved process is as follows: I first thoroughly cleanse the goods by boiling water, or by a boiling solution of soda-ash, caustic soda, carbonate or bisulphite of soda, carbonate of ammonia, soap, or other suitable detergent; then wash in cold water and dry the same. I next pass the cloth in the open state through a vessel containing the necessary coloring-matter and fitted at the end with suitable rollers or bowls, so as to nip or squeeze the cloth after leaving the vessel, only

allowing it to carry the required percentage of coloring-matter, the quantity of which can be regulated by increasing or decreasing the pressure on the cloth by weighted levers, springs, or screws, as usual in such apparatus.

I would here remark that although for the sake of clearness I describe the apparatus which I prefer to employ for this purpose, I do not wish to confine myself to the use of such apparatus entirely; nor do I make any claim to the construction of such apparatus, which is well known and in ordinary use for similar purposes. After passing through the coloring-matter, as above described, the cloth is dried by means of hot air or by passing over heated cylinders, or in any other suitable known manner. The cloth thus dyed and dried is then oxidized and the color fixed and rendered permanent by passing the same (in the open state) through another vessel containing the oxidizing agent in solution. This latter may be a solution of any, or a mixture of some, of the following, viz: bichromate of potash, bichromate of soda, bichromate of ammonia, chromic acid, nitrate of iron, sulphate of iron, sulphate of copper, carbonate of soda, or sulphate of soda. The strength of this solution and the mixture where such is used will vary with circumstances according to the nature of the coloring-matter employed, as will be readily understood by any practical dyer; but for the sake of illustration I may say that a solution of bichromate of potash of a strength of 3° Twaddle will be found to be suitable for fixing the coloring material upon the fibers. After passing through this oxidizing-vessel the cloth should be again nipped or squeezed by passing between rollers for the purpose of saving, or not wasting more than is necessary of, the liquor or solution which is contained in the vessel. This vessel is followed by another vessel suitable for washing the cloth in cold water in the open state.

The next treatment consists in thoroughly cleansing the cloth by passing it through hot water or hot water and soap, or through water and common soda, or water and carbonate of ammonia. This latter process can be effected either while the cloth is in the open state or in the twisted or rope form. Finally, the cloth is washed in cold water and dried.

The coloring-matters employed for dyeing

may be varied considerably, and many well-known or other dyeing solutions may be employed; but I will here mention a few dyeing solutions which I have found to answer well
5 with my improved process.

For black: Sixteen gallons of extract of logwood liquor at 10° Twaddle; two gallons of extract of quercitron-bark liquor at 10° Twaddle; twenty-two gallons of water heated
10 to about 120° Fahrenheit.

Another black: Eighteen gallons of extract of logwood liquor at 10° Twaddle; twenty-two gallons water heated to about 120° Fahrenheit.

15 Blue-black: Sixteen gallons of extract of logwood liquor at 10° Twaddle; two gallons extract fustic liquor at 10° Twaddle; or, two gallons extract of quercitron-bark liquor at 10° Twaddle; or, two gallons extract Persian
20 berries at 10° Twaddle; one and a quarter pounds of benzo-azurine blue dissolved in two gallons of hot water, and half pound of common soda crystals, or one pound carbonate ammonia; twenty-two gallons water heated
25 to about 120° Fahrenheit.

Brown: One pound and a half of cutch or catechu, one gallon hot water, one and a half noggins acetic acid. Dissolve and add one-sixteenth of a gallon extract of fustic liquor at
30 10° Twaddle; one thirty-second of a gallon extract of logwood at 10° Twaddle, heated to about 140° Fahrenheit.

Another brown: Two gallons fustic liquor at 10° Twaddle, half gallon extract of peach-
35 wood liquor at 10° Twaddle, or of sapan-wood at 10° Twaddle; half gallon of extract of logwood liquor at 10° Twaddle; five gallons water at about 140° Fahrenheit.

Bronze or gold shade: Sixteen gallons extract of fustic liquor at 10° Twaddle, twenty-
40 two gallons water heated to about 140° Fahrenheit.

I may repeat that I do not claim any of the above as new or special dyeing solutions, or

as constituting any part of my invention; but 45 I give them as illustrations of solutions which are suitable for use with my new process.

What I consider to be the principal novel features of my improved process are as follows:
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First. Submitting a woven or knitted fabric of undyed mixed animal and vegetable fibers (after suitable cleansing) to a bath of the coloring matter or solution without any mordant whatever, and then drying the same. 55

N. B.—This drying operation after the absorption of the necessary amount of coloring material is most important, as it prevents any appreciable quantity of the coloring-matter from being dissolved out and wasted before 60 the oxidizing agent has fixed the same.

Second. Oxidizing the coloring material on the dried fabric by any of the solutions or agents above named, or by any other known oxidizing agent which will have the same 65 property of indelibly fixing the colors upon both the vegetable and animal fibers at one and the same operation.

I claim—

The process of dyeing woven or knitted 70 fabrics of mixed vegetable and animal fibers, (such as yarns woven together in the gray state,) consisting in first submitting the mixed fabric to a bath of the required coloring matter or solution without any mordant; second, 75 drying the fabric; third, oxidizing the coloring material on the dried fabric by passing the same through a solution having the property of fixing the colors upon both the vegetable and animal fibers at one and the same 80 time, all substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

THOS. INGHAM.

Witnesses:

JNO. HUGHES,
CHARLES A. DAVIES.